THE EPIPHYTIC FLORA OF DIPTEROCARPUS OBLONGIFOLIUS, Bl. ("Neram").

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Dipterocarpus oblongifolius, Bl. is a common tree on the banks of rivers and streams, especially east of the Main Range of the Malay Peninsula, and is abundant on some of the tributaries of the Pahang river. It appears to be confined to riverbanks, and is a massive tree, though not usually tall as compared with other Dipterocarps.

Its ability to grow on steep banks and its resistance to floods are remarkable. This is probably due in part to its root system. Judging from specimens seen which had their roots exposed by floods, the roots do not penetrate deeply into the soil but spread over a large area and are so tenacious that the whole top of a tree may be wrenched off by pressure of floodwater and drift-wood, leaving the roots and lower part of the trunk undisturbed.

Where the trees grow on steep banks, the base of the trunk is almost at right angles to the bank. The more nearly perpendicular the bank the more nearly horizontal the base of the trunk, which then curves gradually upwards but seldom attains a perpendicular position. The same method of growth may be observed in such plants as *Pandanus* growing on very steep limestone cliffs. The upper surface of the basal portion of the trunk of the *neram* is extended into a flange, so that a cross section of the trunk at this point would be roughly a triangle with a rounded base, or somewhat pearshaped. This extension of the trunk no doubt acts as a stay, and the tree is actually not buttressed in any way, as there is no buttress development on the lower surface of the trunk, and less development of roots in the direction of the water than in other directions.

In some localities the *neram* trees carry a large and varied epiphytic flora, which is more easily examined than that on tall forest trees, as the former are usually not difficult to climb and can be examined from the streambed with comparative ease. A census of this epiphytic flora was attempted during an expedition to one of the small tributaries of the Tembeling river (Sungai Sat) in July, 1929 and to Sungai Ketil, Kelantan in the following month. It is noticeable that on the banks of the larger rivers, such as the Tembeling in Pahang and the Lebir in Kelantan, where the original vegetation has been cleared, the *neram* trees, where they have been allowed to remain, carry few epiphytes, but on the smaller rivers, where the original vegetation has not been destroyed, and where the trees meet overhead, epiphytes are much more numerous. The luxuriance of the epiphytic flora,

however, varies in a curious way. For instance, the trees along the Sungai Terang, a small tributary of the Lebir, carried few epiphytes compared with those on the Sungai Sat, although one would have said that the conditions were more favourable on the former river. The same applies to the epiphytic flora of *Saraca*. In some places these trees are loaded with small orchids, while in other apparently similar localities they bear none.

It was found that the orchids were the most numerous and for this reason they were given more attention than other groups. For the identification of these I am indebted to Mr. C. E. Carr, whose detailed knowledge of the local orchid flora enabled him to identify most of the specimens although they were not flowering.

The method adopted was to send one or two men up the tree with instructions to strip off and throw down every epiphyte they could see. Branches were cut off and examined for such small plants as *Taeniophyllum*, and field glasses were used to ensure that nothing was missed. As far as possible identifications were made on the spot, and anything which could not be dealt with in this manner was preserved for future study. Probably about 10—20 per cent. of the total area of each tree was examined, the search being naturally restricted to the trunk and lower, stouter branches. Without felling the tree the canopy could not be examined. Many *Taeniophylla* are often confined to one or two branches and do not spread over the whole tree, and some species such as *Thrixspermum* grow amongst the leaves towards the tips of the branches in more or less full sunlight. However, the proportion of the epiphytic flora enumerated here is considerably more than 20 per cent. of the total, as the bulk of the epiphytes grow on the trunk and lower branches.

It was found impossible to make a count of individual plants. Some orchids and such ferns as *Drynaria quercifolia* were exceedingly abundant on some trees.

The following are the flowering plants (excluding orchids) and ferns :—

Vitis macrostachya, Miq.; Vitis sp.; Pachycentria tuberculata, Korth.; Medinilla Hasseltii, Bl.; Medinilla sp.; Schefflera Ridleyi, Vig.; Myrmecodia tuberosa, Jack; Hydnophytum formicarium, Jack; Vaccinium acuminatissimum, Miq.; Rhododendron Teysmanni, Miq.; Hoya latifolia, Don; Hoya sp.; Fagraea auriculata, Jack; Aeschynanthus radicans, Jack; Helixanthera coccinea, Dans.; Ficus consociata, Bl.; Ficus diversifolia, Bl. var. Kunstleri; Ficus diversifolia, Bl. var. ovoidea; Ficus parietalis, Bl.; Pothos sp.; ?Anadendrum sp.; Asplenium pellucidum, Lam.; Asplenium spathulinum, J. Sm.; Cyclophorus varius, Gaud.; Drynaria quercifolia, L.; Humata angustata, J. Sm.; Humata heterophylla, Desv.; Platycerium Ridleyi, Christ.; Polypodium lomarioides, Kze;

Polypodium mettenianum, Ces.; Polypodium phymatodes, L.; Polypodium revolutum, C. Chr.; Polypodium sinuosum, Wall.; Trichomanes minutum, Bl.; Trichomanes pallidum, Bl.; Vittaria elongata, Sw.; Vittaria ?ensiformis, Sw.; Lycopodium laxum, Spr.; Lycopodium nummularifolium, Lycopodium phlegmaria, L.; Lycopodium phyllanthum, H. & A.

Six trees were examined particularly for orchids and the results are given in tabulated form below. The first three trees were in a group together, numbers four and five were together some distance upstream, and number six was on another small stream about a mile distant from the others.

——	1	2	3	4	5	6
Oberonia anceps, Lindl.			x			
Hippeophyllum Scortechinii, Schltr. ...			x			
Platyclinis longifolia, Hemsl. ...			x		x	
Dendrobium acerosum, Lindl. ...	x				x	
,, atropurpureum, Miq. ...			x			
,, bifarium, Lindl. ...		x				
,, eulophotum Lindl. ...	x				x	
,, Farmeri, Paxt. Mag. ...		x	x	x		
,, fugax, Schltr. ...		x	x			x
,, grande, Hook. f. ...					x	
,, Hosei, Ridl.				x	x	
,, indragiriense, Schltr. ...					x	
,, leonis, Rchb.				x		x
,, lonchophyllum, Hook. f.					x	
,, pensile, Ridl.	x	x	x	x	x	
,, pumilum, Roxb. ...	x			x	x	x
,, serra, Lindl.			x		x	
,, teres, Lindl.	x					
Bulbophyllum odoratum, Lindl. ...					x	x
,, lepidum, J.J.S. ...	x	x		x		x
,, medusae, Rchb. f. ...					x	x
,, purpurascens, Teysm. ...				x	x	x
,, restrepia, Ridl. ...	x					
,, vaginatum, Rchb. f. ...	x	x				x
Eria floribunda, Lindl.	x	x		x	x	
,, neglecta, Ridl.				x		x
,, suaveolens, Ridl.	x	x		x	x	
,, xanthocheila, Ridl.		x				x
Trichotosia Teysmanni, Kranzl. ...		x				x
,, velutina, Kranzl. ...	x					
Tylostylis rigida, Bl.			x			
Coelogyne Rochusseni, De Vr. ...	x		x	x		
,, testacea, Lindl. ...			x			
Cymbidium pubescens, Lindl. ...	x	x				x
Grammatophyllum speciosum, Bl. ...				x		
Saccolabium Hendersonii, Carr ...					x	
,, undulatum, Ridl. ...			x			

——	1	2	3	4	5	6
Renanthera elongata, Lindl. ...	x					
Sarcanthus Scortechinii, Hook. f. ...		x				x
Pomatocalpa Kunstleri, J.J.S. ...		x				
Sarcochilus pusillus, Rchb. f. ...			x			
,, virescens, Ridl. ...			x			
Taeniophyllum obtusum, Bl. ...			x			x
Poaephyllum pauciflorum, Ridl. ...		x	x			x
Appendicula cornuta, Bl.		x				x
Podochilus tenuis, Lindl.						x
Agrostophyllum bicuspidatum, J.J.S. ...	x	x	x	x	x	x
,, Hasseltii, J.J.S. ...	x	x	x	x	x	x
Oxyanthera decurva, Hook. f. ...						x
Thrixspermum pardalis, Carr ...			x			
Number of species on each tree ...	16	17	19	14	18	20

There were also two Eria spp. of the section *Hymeneria,* and a Bulbophyllum of the section *Aphanobulbon,* unidentified. Fifty known species and three unidentified species were therefore found on these six trees. The two species occurring on all six trees were *Agrostophyllum bicuspidatum* and *A. Hasseltii.* The only species common to the three trees close together were *Agrostophyllum bicuspidatum, A. Hasseltii* and *Dendrobium pensile.*

The following orchids were found on other *neram* trees :—

Liparis lacerata, Ridl.
Dendrochilum sp.
Dendrobium aggregatum, Roxb.
,, crumenatum, Sw.
,, Haniffii, Ridl.
,, luxurians, Carr
,, salaccense, Lindl.
,, flavidulum, Hook. f.
Bulbophyllum abbrevilabium, Carr
,, clandestinum, Lindl.
,, tortuosum, Lindl.
Eria pendula, Ridl.
,, pannea, Lindl.
,, leiophylla, Lindl.
,, stellata, Lindl.
,, biflora, Griff.
Trichotosia vestita, Kranzl.
Chelistonele sp.

Coelogyne Kingii, Hook. f.
,, stenophylla, Ridl.
Cymbidium aloifolium, Sw.
Acriopsis javanica, Reinw.
,, sp.
Agrostophyllum majus, Hook. f.
Bromheadia alticola, Ridl.
,, rupestris, Ridl.
Dilochia Wallichii, Lindl.
Thrixspermum arachnites, Rchb. f.
,, rubrocallosum, Carr
Taeniophyllum pahangense, Carr
Sarcochilus biserratus, Ridl.
Ceratostylis pendula, Hook. f.
Sarcanthus halophilus, Ridl.

The total number of species of orchids found on *neram* within a limited area is thus eighty-seven.

As a contrast to the *neram* flora, two trees of *Saraca bijuga* were examined for orchids and their flora was found to consist mainly of the following :—

Dendrobium subflavidum, Ridl.
Bulbophyllum nigropurpureum, Carr
Chamaeanthus laciniatus, Carr
Saccolabium Hendersonii, Carr
,, undulatum, Ridl.
Sarcochilus caligaris, Ridl.
,, ciliatus, J.J.S.
,, incurvicalcar, J.J.S.
,, pusillus, Rchb. f.
,, siamensis, Carr
Pomatocalpa Kunstleri, J.J.S.
Thrixspermum arachnites, Rchb. f.
Taeniophyllum obtusum, Bl.
,, rugulosum, Carr
Appendicula pendula, Bl.

It will be noticed that none of the commonest orchids on *neram* occur on *Saraca, e.g.* Dendrobium pensile, D. pumilum, Bulbophyllum lepidum, Eria floribunda, E. suaveolens, Agrostophyllum Hasseltii, A. bicuspidatum, are absent. The orchid flora of *Saraca* consists mainly of small plants such as Saccolabium, Sarcochilus, Thrixspermum, Taeniophyllum, etc., and large plants, such as Grammatophyllum, Coelogyne, Cymbidium, etc. are conspicuous by their absence.